



6. A luminescent device comprising a  $^{12}\text{C}$  or  $^{13}\text{C}$  isotopic diamond which is boron-doped, has a high thermal conductivity and is isotopically purified.

5 7. A semiconductor device comprising a  $^{12}\text{C}$  or  $^{13}\text{C}$  isotopic diamond which is boron-doped, has a high thermal conductivity and is isotopically purified.

10 8. A process for producing a  $^{12}\text{C}$  or  $^{13}\text{C}$  isotopic diamond single crystal, comprising providing a carbon containing isotopically purified  $^{12}\text{C}$  or  $^{13}\text{C}$  as a material, employing a flux containing a nitrogen getter, adding boron into said carbon material and/or the flux, or around said carbon material and the flux, and diffusing  
15 said carbon material into the flux under a high pressure and a high temperature, whereby a boron-doped diamond single crystal is formed on a seed crystal diamond.

20 9. A process for producing a  $^{12}\text{C}$  or  $^{13}\text{C}$  isotopic diamond single crystal as claimed in Claim 8, wherein the purity of the  $^{12}\text{C}$  or  $^{13}\text{C}$  isotope of said material carbon is at least 99.5%.

25 10. A process for producing a  $^{12}\text{C}$  or  $^{13}\text{C}$  isotopic diamond single crystal as claimed in Claim 8, wherein the concentration of said boron is less than 100 ppm.

30 11. A process for producing a  $^{12}\text{C}$  or  $^{13}\text{C}$  isotopic diamond single crystal as claimed in Claim 8, wherein said material carbon is a pyrolytic carbon, a diamond synthesized by chemical deposition, or a diamond-like carbon synthesized by chemical decomposition.

000027 6623260

12. A process for producing a  $^{12}\text{C}$  or  $^{13}\text{C}$  isotopic diamond which is boron-doped and has a high thermal conductivity, comprising providing a mixed gas of an isotopically purified hydrocarbon or carbon monoxide or carbon dioxide containing  $^{12}\text{C}$  or  $^{13}\text{C}$  or a mixed gas of at least two thereof and hydrogen, adding a doping component thereto, and forming a diamond in a thin-film state on a substrate in the presence of a reaction atmosphere.

13. A process for producing a  $^{12}\text{C}$  or  $^{13}\text{C}$  isotopic diamond which is boron-doped and has a high thermal conductivity as claimed in Claim 11, wherein the hydrocarbon comprising isotopically purified  $^{12}\text{C}$  or  $^{13}\text{C}$  is  $^{12}\text{CH}_4$  or  $^{13}\text{CH}_4$ .

14. A  $^{12}\text{C}$  or  $^{13}\text{C}$  isotopic diamond which is boron-doped, has a high thermal conductivity and is isotopically purified as claimed in Claim 1, wherein said high thermal conductivity is from about 26-31 W/cm $^{\circ}\text{K}$ .

15. A process for producing a  $^{12}\text{C}$  or  $^{13}\text{C}$  isotopic diamond single crystal as claimed in Claim 8, wherein said isotopic diamond single crystal has a thermal conductivity from about 26-31 W/cm $^{\circ}\text{K}$ .

16. A process for producing a  $^{12}\text{C}$  or  $^{13}\text{C}$  isotopic diamond which is boron-doped and has a high thermal conductivity as claimed in Claim 12, wherein said high thermal conductivity is from 26-31 W/cm $^{\circ}\text{K}$ .

Add  
B. 1